

Claims:

1. A guide apparatus for guiding an advancing continuous fiber bundle used when winding the fiber bundle on a bobbin, which comprises:

5 a pair of a first guide and a second guide both of which guides are disposed on the passage on which the fiber bundle is advanced, and the axis lines of the guides, on which guides the fiber bundle is advanced in a twisted state, are in a relation twisted away from each other in a space, and

10 a parallel guide, which is disposed at the downstream side of the pair of the guides on the passage, through which the fiber bundle is guided to the bobbin in a state of twisted back, and which has the axis line parallel to that of the bobbin,

15 the first guide being a flat guide or a conical guide, the second guide being a conical guide, and the position at which the fiber bundle is wound on the bobbin and the width of the fiber bundle being stabilized by means of the parallel guide.

2. The guide apparatus according to claim 1 wherein the first guide is a flat guide.

20 3. The guide apparatus according to claim 1 or 2 wherein the second guide is disposed so that the axis line of the guide has an inclination of less than 90° toward the axis line of the bobbin.

4. The guide apparatus according to claim 1 wherein the pair of the guides is arranged so that the fiber bundle is twisted about 25 right angle by means of the pair of the guides.

5. The guide apparatus according to claim 1 wherein the pair of the guides and the parallel guide are supported by means of a common

supporting means so as to move in linkage, and the supporting means is reciprocatively moved in the direction parallel to the axis line of the bobbin by means of a traverse mechanism along nearly the whole length of the bobbin.

5 6. A winding machine for winding an advancing continuous fiber bundle on a bobbin, which comprises:

    a guide portion comprising the guide apparatus defined in claim 1, and a winding portion,

10     in the guide portion, a first fixed guide roll is further disposed above the guide apparatus with the axis line of the first fixed guide roll being parallel to that of the bobbin, and

    the rotational driving of the bobbin in the winding portion being carried out by means of a torque motor.

7. The winding machine according to claim 6 wherein the first fixed guide roll is disposed so that one first fixed roll is disposed for a unit of bobbin, and the first fixed guide roll has a shape of a hand drum trunk of which has a curved circumferential surface depressed at its center portion.

20 8. The winding machine according to claim 7 wherein a second fixed guide roll is further disposed in parallel to the first fixed guide roll at the upper stream side of the first fixed guide roll on the passage for advancing the continuous fiber bundle and above the pair of the first guide and the second guide disposed in the guide apparatus, the second fixed guide roll being a flat roll.

25 9. The winding machine according to claim 6 wherein a third fixed guide roll is further disposed between the first fixed guide roll and the pair of the guides, a dancer roll is still further disposed

between the first fixed guide roll and the third fixed guide roll, and the first and the third guide rolls are flat rolls or hand drum-like rolls having curved circumferential surfaces depressed at their center portions.

5 10. The winding machine according to claim 9 wherein the rotational driving of the bobbin is controlled by a means for controlling the tension of the continuous fiber bundle based on the displacement of the dancer roll, and all of the first and the third fixed guide rolls are flat rolls or hand drum-like rolls having curved 10 circumferential surfaces depressed at their center portions.

11. The winding machine according to claim 9 wherein the rotational driving of the bobbin is controlled by a means for controlling the tension of the continuous fiber bundle based on the displacement of the dancer roll, and the first and the third fixed guide rolls 15 are composed of a combination of a flat roll and a hand drum-like roll having a curved circumferential surface depressed at its center portion.

12. A winding machine for winding a plurality of advancing continuous fiber bundles respectively on a plurality of bobbins, 20 which comprises:

          a guide portion comprising a plurality of the guide apparatuses defined in claim 1, and a winding portion comprising plurality of bobbins,

          in the guide portion, a first fixed guide roll axis line of 25 which is parallel to that of the axis line of a bobbin is further disposed above the guide apparatuses, the first fixed guide roll being a single flat roll so as to guide the plurality of continuous

fiber bundles simultaneously to each of the plurality of guide apparatuses.

13. A method for making a bobbin of a continuous fiber bundle comprising winding an advancing continuous fiber bundle by using  
5 the fiber winding machine defined in claims 6.

14. The method for making a bobbin of a continuous fiber bundle according to claim 13 wherein the continuous fiber bundle comprises 12,000 to 150,000 filaments of carbon fiber.

15. A carbon fiber bobbin obtained by the method defined in claim  
10 13.